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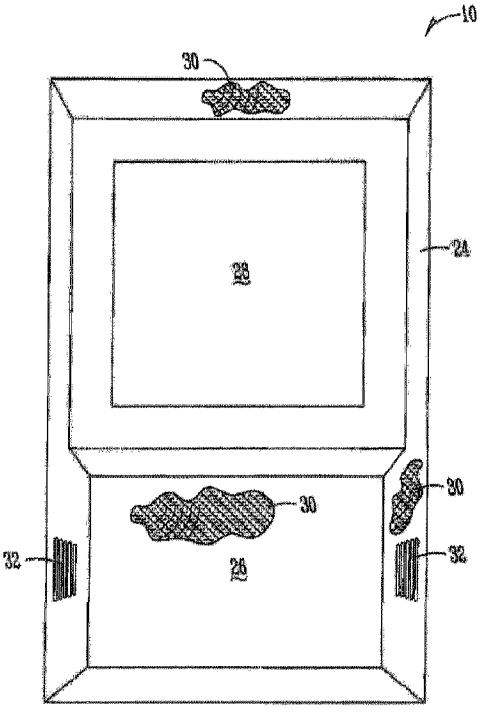
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(54) Title: FLYING INSECT ATTRACTION STATION



(57) Abrégé/Abstract:
A flying insect station for attracting and killing insects on the exterior and interior of a structure is disclosed. The flying insect station includes features for attracting and killing files within a shortened window of time, preferably within one hour. The station includes in

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(57) Abrégé(suite)/Abstract(continued):
one aspect a surface being substantially dark in color and substantially reflective in nature to provide a facade of an opening. Suppression means such as a pesticide is included on one or more of the surfaces of the station for killing flying insects staging on the surface(s). An attractant may be used to provide a plume of attractant around surfaces of the housing to attract and lure flying insects to stage about one of the surfaces. Increased catch rates for insect suppression devices are realized when used in combination with embodiments of the station.

ABSTRACT

A flying insect station for attracting and killing insects on the exterior and interior of a structure is disclosed. The flying insect station includes features for attracting and killing files within a shortened window of time, preferably within one hour. The station includes in one aspect a surface being substantially dark in color and substantially reflective in nature to provide a facade of an opening. Suppression means such as a pesticide is included on one or more of the surfaces of the station for killing flying insects staging on the surface(s). An attractant may be used to provide a plume of attractant around surfaces of the housing to attract and lure flying insects to stage about one of the surfaces. Increased catch rates for insect suppression devices are realized when used in combination with embodiments of the station.

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FLYING INSECT ATTRACTION STATION

The present application is a divisional application of Canadian Patent Application No. 2,835,372 filed on April 26, 2012

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates generally to a flying insect attraction station and more particularly to a device for use on the exterior or interior of a structure for attracting and killing flying insects entering the structure or residing around the exterior of the structure and within a short window of time.

Description of the Prior Art

Numerous designs of fly traps are commercially available, some use light in the form of color to attract flying insects such as flies, or the like, onto a structure or into an enclosure where they are entrapped and/or killed by a pesticide in solid or gas form. Still, these designs have proven to be only marginally effective at attracting and killing flies within a short window of time. The window of time being measured generally from the moment the fly enters an area, such as the interior or exterior area of a structure, until the fly is attracted to and killed by the suppression means.

It is therefore desirable to provide an attraction station having features that are effective at attracting and killing flying insects within a shortened window of time.

It is further desirable to provide a wall mounted attraction station for use both within and on the exterior of a structure.

SUMMARY OF THE INVENTION

In one embodiment, the invention is an attraction station for killing flying insects, such as synanthropic flies. The station includes at least one surface being substantially dark in color and substantially reflective in nature providing an appearance of an opening. A pesticide is included on the surface for killing flying insects staging on the surface. In a preferred form, the station is used in combination with an attractant housing positioned generally below the surface. The housing is adapted for holding an attractant providing a plume of attractant around surfaces adjacent

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and above the housing. The surface is substantially black in color and includes a reflective surface selected from a group consisting essentially of a reflective laminate, a mirror, Plexiglas, reflective paint, and glass.

In another embodiment, the invention is a wall-mounted attraction station for killing flying insects. The station includes at least one generally planar reflective surface framed at least in part by a dark colored surface. At least a portion of the dark colored surface extends outward from the reflective surface to locate the portion away from the wall. A pesticide is included on one or more surfaces for killing flies staged about the reflective surface. In a preferred form, the station includes an attractant housing at least partially enclosed beneath the portion of the dark colored surface extending outward from the reflective surface for providing a plume of attractant at the dark colored surface.

In another embodiment, the attraction station includes a reflective surface providing an appearance of an opening, a dark colored surface adjacent to and positioned at least partially outward from the reflective surface, and a pesticide on the dark colored surface for killing the flies staged about the reflective surface. In a preferred form, the dark colored surface is a housing surrounding the reflective surface and the housing has a generally planar surface adapted for mounting the housing to a wall and orienting the reflective and dark colored surface generally vertically.

In another embodiment, the attraction station includes a generally dark colored panel having a first portion with a generally reflective surface, a second portion raised and staged about the first portion, and a pesticide on surfaces surrounding the first portion for killing flying insects staged about the first portion of the panel. The second portion may also include an attractant housing positioned generally beneath the raised second portion having an attractant for providing a plume around the second portion. The attractant housing is formed at least in part by the second portion and below the first portion of the panel.

In another embodiment, the attraction station includes a panel adapted for mounting against a wall and an outward portion of the panel having a generally vertical surface. An attractant housing is positioned below and provides a plume of attractant at the outward portion and vertical surface of the panel, and a pesticide is on at least a portion of the panel. In a preferred form, the outward portion is

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substantially dark in color and includes a portion of the pesticide, and the generally vertical surface is reflective.

In another aspect of the invention, a system for killing flying insects is disclosed. The system includes an insect suppression device having a housing with a light source for attracting flying insects. A surface separate from the housing and being substantially dark in color is in contact with or in generally close proximity to the insect suppression device for flying insects to stage thereon. The surface used in combination with the insect suppression device has a synergistic effect greater than if either is used alone.

In another aspect of the invention, a method for increasing the catch rate of an insect suppression device is disclosed. This is achieved in at least one way by placing an insect suppression device at a location, taking a panel being substantially dark in color and separate from the insect suppression device and positioning the panel at the location in contact with or in close proximity to the insect suppression device.

BRIEF DESCRIPTION OF THE DRAWINGS

Figs. 1A-C are illustrations of exemplary features and aspects of the present invention.

Fig. 2 is a front elevation view of an attraction station in accordance with an exemplary embodiment of the present invention.

Fig. 3 is a rear elevation view of the station illustrated in Fig. 2.

Fig. 4 is a bar chart illustrating the effectiveness of various flying insect traps after one hour of elapsed time.

Fig. 5 is a bar chart illustrating the knock down effectiveness of various features of the present invention after one hour of elapsed time.

Fig. 6 is a bar chart illustrating the mortality effectiveness after one hour depending upon placement of the station.

Fig. 7 is an illustration of another exemplary aspect of the present invention.

Fig. 8 is a bar chart illustrating the mortality effectiveness after one hour of another exemplary embodiment of the present invention.

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Fig. 9 is a plot illustrating the catch rate change resulting from a variation of the panel size.

Fig. 10 is a plot illustrating the mortality rate change resulting from a variation of the distance between the panel and insect suppression means.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figs. 1A-C describe exemplary features and concepts of the present invention by illustration. The intent of the preferred embodiments of the present invention is to provide features that both attract and kill flying insects on the exterior or interior of a structure in a shortened or finite window of time. The window of time being measured generally from when the fly enters an area, such as the interior or exterior area of the structure, and until the fly is attracted to and killed by the attraction station.

Exemplary features and aspects of the present invention for attracting and killing flying insects, such as synanthropic flies, fruit flies, filth flies, etc., within a shortened window of time are illustrated in Figs. 1A-C. For example, Fig. 1A illustrates an exemplary embodiment of a flying insect station 10 of the present invention. The flying insect station 10 includes a first panel 12 which is generally planar and has a surface configuration to provide some reflectivity, preferably specular reflectivity. To provide the reflectivity requirement of the first panel 12, the first panel 12 is comprised of a reflective material providing specular reflection. Reflective materials for example include Plexiglas, glass, a mirror, reflective paint, reflective films/laminates, etc. Other materials and surfaces providing specular reflection are also contemplated by the present invention. The first panel 12 is also generally planar, and due to the reflectivity of the surface provides an appearance of an opening or a hole. Both laboratory and field studies conducted at various locations indicated that flies were attracted to and landed near openings, holes, entrances, and exits that lead to potential breeding sources. Both male and female flies were observed to be found at openings on the ground in front of an opening and on edges and surfaces inside and outside openings. Thus, the reflective surface of the first panel 12 provides an appearance of an opening or hole to attract and lure flying insects to stage about the first panel 12.

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The first panel 12 may also be configured so as to be wall mountable. On the wall, the first panel is oriented vertically or parallel with the wall. The first panel 12 may include some depth to raise the surface of the first panel 12 from off of the mounting surface such as a wall. A second panel 14 is used in combination with the first panel 12. The second panel 14 provides a surface for flying insects to stage about the first panel 12. The first and second panel 12 and 14 may be integral components or separate panels mountable adjacent one another. The second panel 14 may include a depth sufficient to raise the surface of the second panel 14 out away from a mounting surface such as a wall. The depth of the second panel 14 may exceed the depth of the first panel 12 so that the surface of the second panel extends further outward from the mounting surface than the surface of the first panel 12. The first and second panel 12 and 14 may also be configured with generally equivalent depths so that the surface of the first panel 12 and the surface of the second panel 14 occupy generally the same plane. The second panel 14 may be hollow through its depth or include an enclosed cavity beneath the surface. The surface of the second panel 14 is preferably dark in color. In one embodiment, the surface of the second panel 14 is substantially black, preferably gloss or high gloss. Both field and laboratory research indicated that dark objects placed near an entrance or opening to a structure proved successful in attracting flies onto the surface of the second panel 14 to stage about the first panel 12, where the surface of the first panel 12 has an appearance of an opening or hole. Studies indicated that the close proximity of a dark colored surface near an entrance or opening became a preferred base location where flies would frequent the area resulting in predictable landing sites. As further illustrated by Fig. 4, dark colored or matter devices were more effective at attracting and achieving higher mortality rates in a short window of time than other fly suppression devices.

As illustrated in Figs. 1B and 1C, the configuration of the flying insect station may be altered so that a third panel 18, similar to the second panel 14, is positioned above the first panel 12. The second panel 14 and third panel 18 provide additional space for flying insects to locate or stage about the first panel 12. Similarly, the flying insect station 10 shown in Fig. 1C illustrates a fourth panel design 20 which generally surrounds the first panel 12, similar to a frame, to provide

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sufficient space for flying insects to locate and stage about the first panel 12. Research and studies conducted in laboratory and field environments indicated that flies, particularly male flies, space themselves out on surfaces depending upon the number of flies in the area. To provide the optimal spacing in busier or congested areas of the panel, additional surface area is provided in the embodiments illustrated in Figs. 1B and 1C. Variations on the amount of surface area of the first and second panel 12 and 14 illustrated in Fig. 1A are contemplated as shown by Figs. 1B and 1C. The second and third panels 14 and 18 in Fig. 1B may be configured integrally with the first panel 12 or separate from the first panel 12. The collection of panels may be free-standing or mounted on a mounting surface such as a wall so that the second panel 14 and third panel 18 are positioned adjacent to and/or around the first panel 12. Similarly, Fig. 1C may be configured so that the fourth panel 20 surrounding the first panel 12 is integrally connected or separate components. In the embodiments illustrated in Figs. 1A-1C, one or more of the panels may be configured to be replaceable, refreshable, serviceable, or replenishable. In the broadest sense, the configuration of the flying insect station 10 illustrated in Figs. 1A-1C illustrates how two contrasting surfaces, such as the surfaces of the first and second panel 12 and 14 shown in Fig. 1A, provide an attraction mechanism for attracting synanthropic flies to land and stage about the first panel 12.

Each of the flying insect stations 10 illustrated in Figs. 1A-1C may include additionally an attractant 16. Studies and research conducted at laboratories and field environments indicated that the odors associated with fly breeding materials were an important element for attracting and achieving staging of flies about an opening or entrance. The attractant 16 may be a separate and replenishable component of the flying insect station 10. The attractant 16 may be positioned in a cavity behind the outer surface of the second panel 14 as illustrated in Fig. 1A. Depending upon the depth of the second panel 14, a cavity or housing may be formed beneath the surface for receiving an attractant 16. Alternatively, the attractant 16 may be housed within a housing that is either integrally configured with the other components of the flying insect station 10 or removably attached when in use and removed when not in use or when needing replenished. The attractant 16 or the housing holding the attractant 16 may be positioned at a location

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below the second panel 14 as illustrated in Fig. 1B or on the surface of the second panel 14 as illustrated in Fig. 1C. Preferably, the attractant 16 is positioned relative to the second panel 14 in Fig. 1A, the second panel 14 in Fig. 1B, and the fourth panel 20 in Fig. 1C so that the plume from the attractant source surrounds or resides adjacent staging surfaces of the flying insect station 10 around or about the first panel 12.

The attractant 16 may be protected by a housing or by the cavity within the flying insect station 10 where the attractant is placed. Placement within a housing or within a cavity or enclosure of the flying insect station 10 helps protect the attractant 16 for use of the flying insect station 10 outdoors. The attractant 16 is preferably a type of media that the fly perceives as food or breeding material, typically includes high moisture content to provide the creation of an attractant plume rising up from the source to surrounding edges and surfaces of the flying insect station 10. Various types of attractants are commercially available. Of the available attractants, the present invention contemplates at least the use of media such as organic decaying material that has a high moisture content to provide water vapor and includes a perfume or odor to attract flying insects, such as synanthropic flies. Studies and research indicate as shown in Fig. 5 that the combination of the above features, namely a first panel 12 having a reflective surface, a second panel 14 having a dark colored surface and an attractant achieve a high percent of knockdown of the flies within one hour of elapsed time.

The odor producing matrix of the attractant 16 could be in solid or liquid form. Either form could be configured so as to be replenishable or refreshable as needed. The attractant 16 could be a serviceable feature of the station 10. Preferably, the attractant 16 consists of an odor producing matrix that flying insects find attractive and that sustains the production of odor for an extended period of time, such as for example, up to a month or more. Attractant 16, as indicated above, includes water as a part of the matrix formulation. The water component could be metered as an additive over time to refresh or replenish the production of odor.

Additional features of the flying insect station 10 illustrated in Figs. 1A-1C include suppression means such as a pesticide (e.g., an insecticide) and/or bait applied to one or more surfaces of the flying insect station 10. The suppression

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means 22 illustrated in Figs. 1A-1C may be a serviceable component of the flying insect station 10. The suppression means may be in a solid, semi-solid, semi-viscous or liquid form; the suppression means also may be in a gaseous form which is dispensed into the air at or nearby the panels of the flying insect station 10. The suppression means may be a contact insecticide, such as those permissible for use in the food service industry or other industries where the types of available suppression means that can be used are limited by industry specific regulations. The suppression means preferably provides an immediate effect upon the subject fly, such as killing the fly within the desired 60 minute window. The suppression means also preferably has a residual affect that last up to 30 days or more. The suppression means may be replaceable or replenishable, such as where the suppression means comprises a serviceable component of the flying insect station 10. The suppression means 22 may be applied to one or more surfaces of the flying insect station, preferably surfaces where flies congregate or stage about the first panel 12. The suppression means 22 may be applied by spray coating one or more surfaces of the flying insect station 10. The suppression means 22 may also be brushed onto or wiped onto one or more of the surfaces of the flying insect station 10. The suppression means 22 is preferably a long-lasting, slow release contact pesticide, specifically a surface pesticide for indoor or interior use. The effectiveness of the suppression means 22 may be preserved up until actual implementation and use of the flying insect station 10. For example, a peel-away or peel-off outer covering may be used to seal and protect the suppression means 22 until the flying insect station 10 is put into operation. The suppression means 22 may be an integral component of the flying insect station 10 or a separate component that is replaceable or replenishable without replacing the entire flying insect station 10. For example, the suppression means 22 may have a residual affect lasting 30 days and upon the expiration of the 30 day period is replaced with a new suppression means.

In another aspect of the present invention, the suppression means 22 may include a bait portion incorporated into the pesticide formulation or applied on top of the pesticide treatment. The bait is preferably a food source or feeding stimulant, such as sugar, that causes a fly to extend its proboscis and attempt to feed. Bait is an optional component, but it is known that bait enhances the rapidity of the

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pesticide by stimulating ingestion. Surfaces of the flying insect station 10 including the suppression means 22, may include a tacky or adhesive characteristic to increase the time of contact. In a preferred aspect of the present invention, the suppression means 22, such as a pesticide, includes a bait, such as sugar, so that when the fly lands on one or more of the coated surfaces of the flying insect station 10 the taste receptors on the feet of the fly recognize the presence of sugar and the fly open its proboscis to feed. The reaction causes the fly to ingest the pesticide that is mixed with the sugar, resulting in rapid death.

The flying insect station 10 illustrated in Figs. 1A-1C is preferably configured so as to be mountable on a vertical surface such as a wall whereby at least the first panel 12 is oriented vertically or parallel with the wall, and spaced a distance from the wall. The mounting surface or wall is preferably a solid surface. Fig. 6 illustrates the mortality effectiveness after one hour of exposure to the flying insect station 10 based on placement of the station 10 within a room. In a preferred embodiment of the present invention, the flying insect station 10 is placed at a vertical position on a wall generally 1 to 3 feet or 1 to 8 feet from the floor. Horizontal placement of the flying insect station 10, such as on a ceiling, does not result in the desired effectiveness and is not a preferred mounting configuration for the flying insect station 10.

Each of the features addressed above provide a cumulative affect for attracting and killing flying insects within a finite window of time. Some features are more effective than others for attracting flies to stage about the first panel within a short time period. Fig. 5 illustrates the effectiveness of various contemplated and exemplary features of the flying insect station 10. For purposes of example only, a control was used having a black panel with a white attractant tube including a measured amount of aged media. The control did not include a pesticide, and exhibited very little effectiveness at killing flies within a one hour window of exposure. Tests indicated as shown that a white panel with an attractant was marginally more effective than a white panel only. A white panel, reflective surface such as a mirror and an attractant was at least 10% better than a white panel in combination with a reflective surface such as a mirror. A flying insect station that included a black surface whether in combination with an attractant or a reflective

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surface such as a mirror showed measurable improvements over those previously discussed. A flying insect station that included a black colored surface, a reflective surface such as a mirror and an attractant proved to be most effective at knocking down the highest percentage of flies within a one hour window of time. A pesticide was used as a common feature in the various examples illustrated in Fig. 5 for providing suppression. Further studies and research indicated that the features identified above were most effective at attracting and luring a fly into staging about one or more surfaces of the flying insect station surrounding or adjacent the first panel such as a reflective surface for common fly behaviors (e.g., annoyance, breeding, darting/chasing, low exploratory flight, mid-level exploratory flight, and leaving behaviors).

Figs. 2-3 illustrate another exemplary embodiment of flying insect station 10 of the present invention. Fig. 2 shows a front side elevation view and Fig. 3 shows a backside elevation view of the flying insect station 10. The flying insect station 10 includes a frame portion 24 having a generally inwardly tapered surface and providing depth to the flying insect station 10. The surface geometry of the frame 24 may be tapered, rounded, planar or another desired geometry. The backside of the frame includes an outer peripheral edge 34 (illustrated in Fig. 3) that is generally planar or resides in a single plane. The edge 34 allows the flying insect station 10 to be placed flush against a vertical surface such as a wall. The frame 24 provides depth between the wall and other surfaces of the flying insect station 10. The flying insect station 10 includes a first surface 26 extending outward from the outer peripheral edge 34 above the second surface 28. The frame 24 and first surface 26 are preferably a dark color, such as black. A cavity 36 is configured on the backside beneath the first surface 26 as best illustrated in Fig. 3. The cavity 36 may include means for supporting or holding an attractant, such as the attractant 16 illustrated in Figs. 1A-1C. The attractant, as previously discussed, may be a serviceable, replenishable, refreshable, or a consumable portion of the flying insect station 10. One or more surfaces of the flying insect station 10, such as surfaces adjacent the first surface 26, may include a vent 32 to allow a plume of attractant to surround surfaces adjacent and above the cavity 36. The second surface 28 is preferably a reflective surface similar to those discussed above. One or more of the outer

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surfaces of the flying insect station 10 may include a suppression means 30, such as a pesticide for killing flying insects staging about the first surface 26 on the second surface 28 or frame 24. Like the attractant, the suppression means 30 may be a replenishable, refreshable, surfaceable or consumable portion of the flying insect station 10. The outer peripheral edge 34 of the flying insect station 10 orients the first surface 26 and second surface 28 generally vertically relative to the mounting surface, such as a wall. In addition to being wall-mountable, the station 10 may be configured as a free-standing device.

As discussed above, the flying insect station 10 may be used without an attractant or the attractant may be a separate component of the flying insect station 10, such as a free standing component placed or mounted near the flying insect station 10. The flying insect station 10 may be constructed of economically viable material so as to allow the entirety of the flying insect station 10 to be a consumable and replaceable with a new one after the effectiveness of the suppression means and/or attractant have lost their residual effects. The flying insect station illustrated in Figs. 2-3 may include one or more of the features discussed above, alone or in combination with each other, integral to or separated from one another. For example, the first surface 26 may be a separate component from the second surface which is a separate component from the suppression means and/or the attractant. The flying insect station 10 is preferably configured in a panel or frame geometry with one or more of the features of the station being replenishable, refreshable, serviceable or replaceable with a new component. The flying insect station 10 may be configured for either indoor or outdoor use. For example, indoor applications often require compliance with industry specific regulations. Both attractants and suppression means approved for indoor use, such as in the food service industry or other applicable industries, may be used with the flying insect station 10 as described above. These features allow the placement of the flying insect station 10 at or near entrances, windows or where flies accumulate or congregate due to one or more of the behaviors identified above or the presence of food or breeding materials. The flying insect station 10 may also be configured for outdoor use by including a stronger attractant, increasing the size of the device and/or configuration of the geometry of the device so as to protect the attractant and/or suppression means from

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exposure to weather and other outdoor elements. The materials used to configure the flying insect station 10 may also be weather resistant, UV and heat resistant. In some outdoor environments, breeding or attracting grounds exist where the flying insect station 10 may be placed, such as for example without the use of an attractant, for attracting flies to one or more surfaces of the flying insect station 10 within a shortened window of time for providing fly suppression.

Fig. 7 illustrates another exemplary aspect of the present invention. Fig. 7 illustrates a flying insect station 10 such as those previously illustrated. The station 10 may be configured in the form of a panel which is preferably dark in color (e.g., black). As noted above, the station may include a reflective portion integrated into the panel or as a separate component to the panel. The reflective portion provides specular reflection providing an appearance of an opening or a hole. The arrangement of the panel and reflective portion may be configured as described above. The station 10 may also be configured as a panel alone without a reflective portion. The panel may take on various shapes and sizes and is preferably dark in color (e.g., black). The station 10 may also include in addition to a reflective portion and attractant, for example placed within a housing, cavity or enclosure, for providing an attractant plume rising up around the staging areas (e.g., surfaces) of the station 10. The station 10 is placed, mounted near, attached to or otherwise placed in proximity to a means for insect suppression 38. According to an exemplary aspect of the invention, the insect suppression means 38 is a fly suppression device such as an insect trap utilizing ultraviolet ("UV") light in combination with a long-lasting, slow release contact pesticide, such as a surface pesticide. The insect suppression means 38 may also include an attractant (e.g., bait) together with or separate from the pesticide (e.g., glueboard). Further description of the insect trap suitable for use according to the invention is set forth in U.S. Patent Application Serial No. 12/471,087 (Ecolab USA Inc.).

Other insect traps, both light and non-light emitting traps, that may include a bait and/or pesticide may also be used in combination with station 10 to increase the catch rates of the trap, and particularly within the first hour after an insect is first exposed to the system in Fig. 7. The combination of the fly attraction station 10 used in conjunction with insect suppression means 38 such as an insect light trap

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may be used on the interior or exterior of a structure. The use of a fly attraction station 10 in combination with insect suppression means 38 increases the catch rate of the insect suppression means 38. Observations were made of flying insect behavior after they were released into a new environment that led to this conclusion. Specifically, the initial behavior of a flying insect during the first hour after release is categorically definable. These include, as discussed above at least in part, behaviors such as resting (e.g., sitting in one place without flying for 10 minutes or more), low exploring (e.g., slow flight within one foot from the floor), mid-exploring (e.g., flight between one and six feet from the floor), leaving (rapid flight, usually at a more rapid pace and usually more than six feet from the floor), darting/chasing (predominantly male fly behavior attempting to mate with female flies as they fly by. Male fly stage on surfaces near fly-ways and dart after passing flies), breeding (predominantly female fly behavior in and on possible breeding material), and annoyance (fly behavior based near and/or on humans in the area). When a flying insect is first released into a new area, there is usually a period of acclimation where the fly stays close to the release point and begins to explore surrounding areas. Introduced flies may also establish a temporary "base" from which they explore their surroundings. A base is a general area that a fly will leave from when exploring and return to at the end of the exploratory flight. Annoyance behavior is when the base is a human and the fly repeatedly lands on or near the human, even when the human moves to a new location. Exploratory flight is not necessarily random. When flying, exploring flies appear to be attracted to dark objects and surfaces. Flies fly towards dark objects, repeatedly near dark objects, and around dark objects. Flies actively explore openings and dark, recessed areas. Flies actively fly to where movement, such as human activity, is found. Resting sites are also not necessarily random. Flies tend to prefer resting locations with broad views. They may land more often on dark surfaces, but this is not necessarily a significant trend or general rule.

Tests of the exemplary configuration of a station 10 and insect suppression means 38 (e.g., insect light trap) shown in Fig. 7 were conducted. According to one aspect of the invention, elements, such as a panel, having a dark color (e.g., black) are used in combination with insect suppression means 38 within a flight room. Fig.

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8 illustrates a bar chart evidencing the increased catch rate that was observed with the addition of a dark color in the vicinity of the insect suppression means 38. The first two bars on the chart shown in Fig. 8 illustrate the increase in catch rate, which nearly doubles, when the insect suppression means 38 (e.g., the shroud of an insect trap) is a dark color such as black compared to one that is not. The mortality percentages at one hour continue to increase when insect suppression means 38 that is dark in color is used with a reflective surface such as a mirror or used in combination with an attractant such as an odor or bait. The subsequent bars in the chart shown in Fig. 8 show a high mortality occurring within a one hour period for instances of use where a dark panel was used in combination with insect suppression means 38, such as an insect light trap. Thus, a dark element such as the dark colored station 10 (e.g., panel, surface or the like) illustrated in Fig. 7 in combination with insect suppression means 38, whether located near, attached to, or otherwise placed in proximity to the insect suppression means 38, exhibits an increased mortality rate within the one hour period as shown in Fig. 8.

The present invention contemplates that the panel as part of the station 10 illustrated in Fig. 7 may be configured in various sizes and shapes. Preferably, the panel is mountable on a vertical surface such as a wall, ceiling or floor. Laboratory tests were conducted to determine the optimal size of a dark panel placed in proximity to insect suppression means 38 (e.g., insect light trap), and the results are shown in the plot illustrated in Fig. 9. The plot shows a significant increase in the catch rate as the surface area of the panel is increased, at least up to a surface area of roughly 400 square inches. Thus, catch rates did not show any significant increase for dark panel surface areas in excess of 400 square inches. Laboratory tests were also conducted to determine how close the station 10 should be positioned relative to the insect suppression means 38. Fig. 10 illustrates the results from a dark panel having a surface of roughly 432 square inches used at varying distances relative to the insect suppression means 38 (e.g., insect light trap). The percentage of flies caught by the insect suppression means 38 within one hour decreases by nearly half as the distance between the dark panel and the station increases up to 30 inches. The highest effectiveness by percent mortality is realized by placement of the insect suppression means 38 next to or proximate the station 10 as shown in Fig. 7. Thus,

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the results show that a dark color panel such as the station 10 shown in Fig. 7 placed in close proximity to insect suppression means 38 (e.g., an insect light trap) can significantly increase catch rates. Even a dark color panel having a size of 10 inches by 10 inches, for example, can significantly increase catch rates when used in combination with insect suppression means 38.

While the flying insect station 10 here and before described is effectively adapted to fulfill the aforementioned objectives, it is to be understood that the invention is not intended to be limited to the specific preferred embodiments of the aspects disclosed and set forth above. Rather, it is to be taken as including all reasonable equivalents to the subject matter of the appended claims.

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CLAIMS:

1. A system for killing flying insects comprising:

an insect suppression device having a housing with a light source for attracting flying insects; and

a surface separate from the housing, the surface free from a light source or a heat source and being dark in color and in contact with or in close proximity to the insect suppression device for flying insects to stage thereon;

wherein the light source of the insect suppression device is directed otherwise than towards the surface; and

wherein the surface in combination with the insect suppression device has a synergistic effect greater than if used alone.

2. The system of claim 1 wherein the surface includes a reflective portion for providing an appearance of an opening.

3. The system of claim 1 wherein the insect suppression device includes a pesticide and an attractant.

4. The system of claim 1 wherein surface includes a pesticide for killing flying insects staging on the surface.

5. The system of claim 1 further comprising an attractant housing positioned at the surface.

6. The system of claim 1 wherein the surface forms a portion of a wall-mounted panel.

7. A system for killing flying insects comprising:

an insect suppression device having a housing with a light source for attracting flying insects; and

a panel separate from the housing, the panel being dark in color, free from a light source or a heat source, and having a reflective portion for providing an appearance of an opening;

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the panel in contact with or in close proximity to the insect suppression device for flying insects to stage thereon;

wherein the light source of the insect suppression device is directed otherwise than towards the panel; and

wherein the panel in combination with the insect suppression device has a synergistic effect greater than if used alone.

8. The system of claim 7 wherein the panel and/or the insect suppression device include a pesticide.

9. The system of claim 7 wherein the panel and/or the insect suppression device include an attractant.

10. The system of claim 7 wherein the reflective portion is surrounded at least in part by the panel.

11. A method for increasing the catch rate of an insect suppression device, comprising:

placing an insect suppression device at a location, said insect suppression device comprising a housing comprising a light source for attracting flying insects;

taking a panel free from a light source and being dark in color and separate from the insect suppression device; and

positioning the panel at the location in contact with or in close proximity to the insect suppression device and wherein the light source of the insect suppression device is directed otherwise than towards the panel.

12. The method of claim 11 comprising increasing the insect catch rate using a synergistic effect from the panel used in combination with the insect suppression device.

13. The method of claim 11 wherein the panel and the insect suppression device are wall mounted at the location.

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14. The method of claim 11 comprising positioning an attractant at the panel and/or insect suppression device.

15. The method of claim 11 comprising using a pesticide with the panel and/or insect suppression device.

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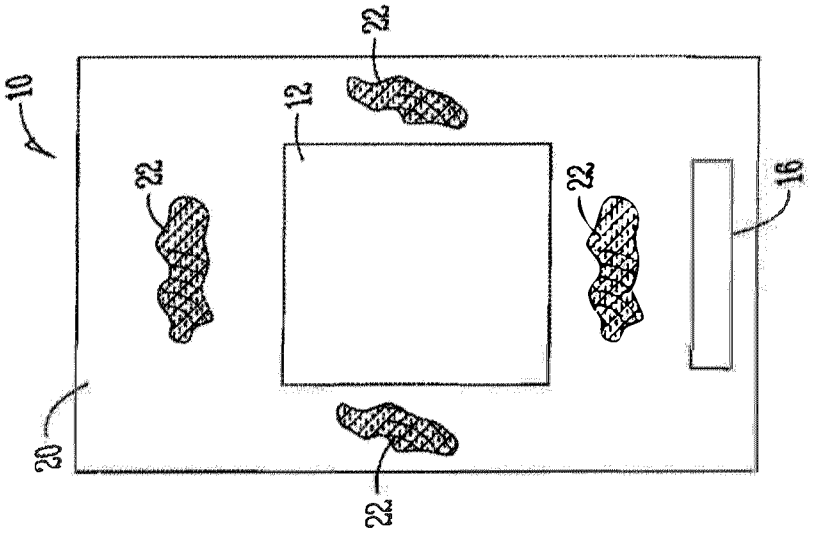


FIG. 1C

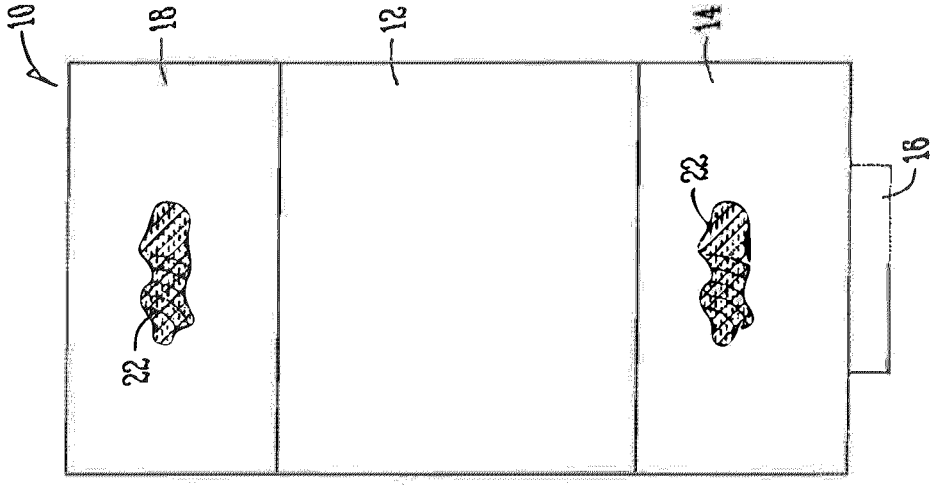


FIG. 1B

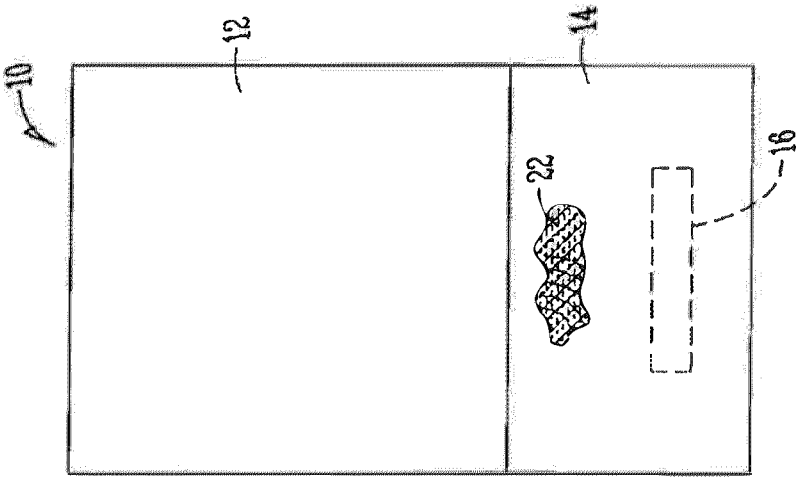


FIG. 1A

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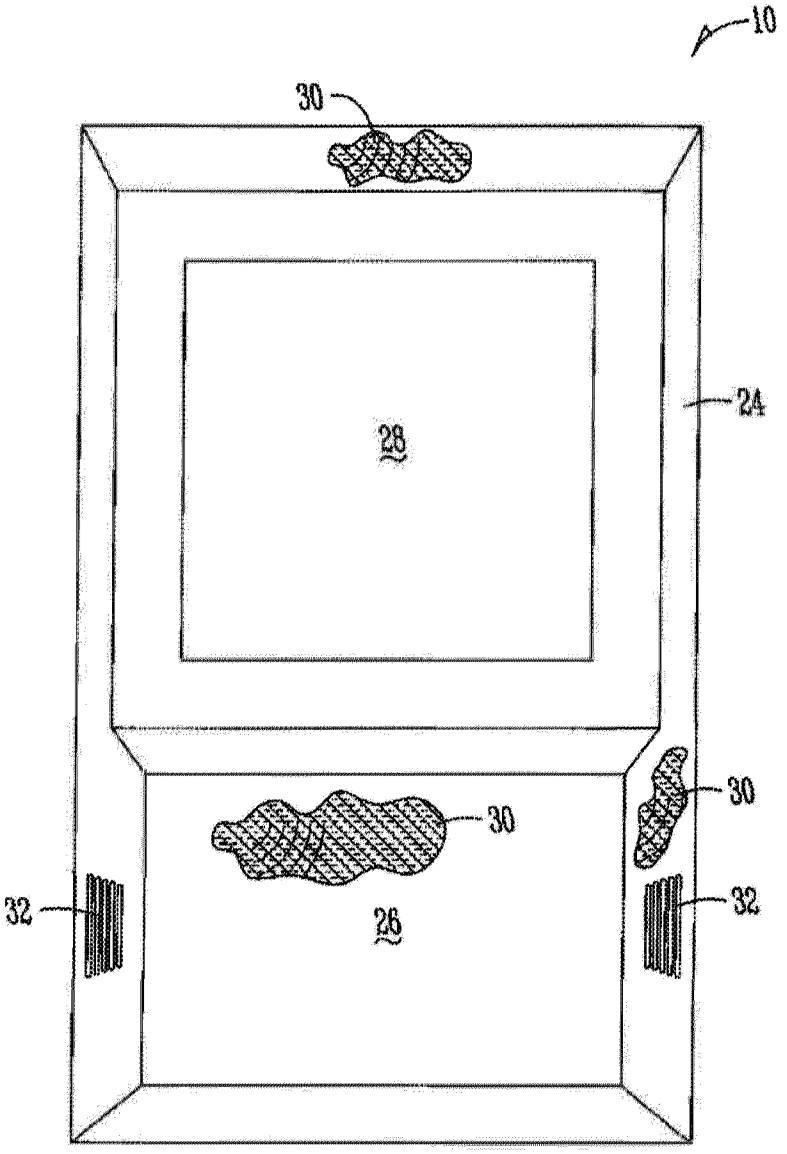


FIG. 2

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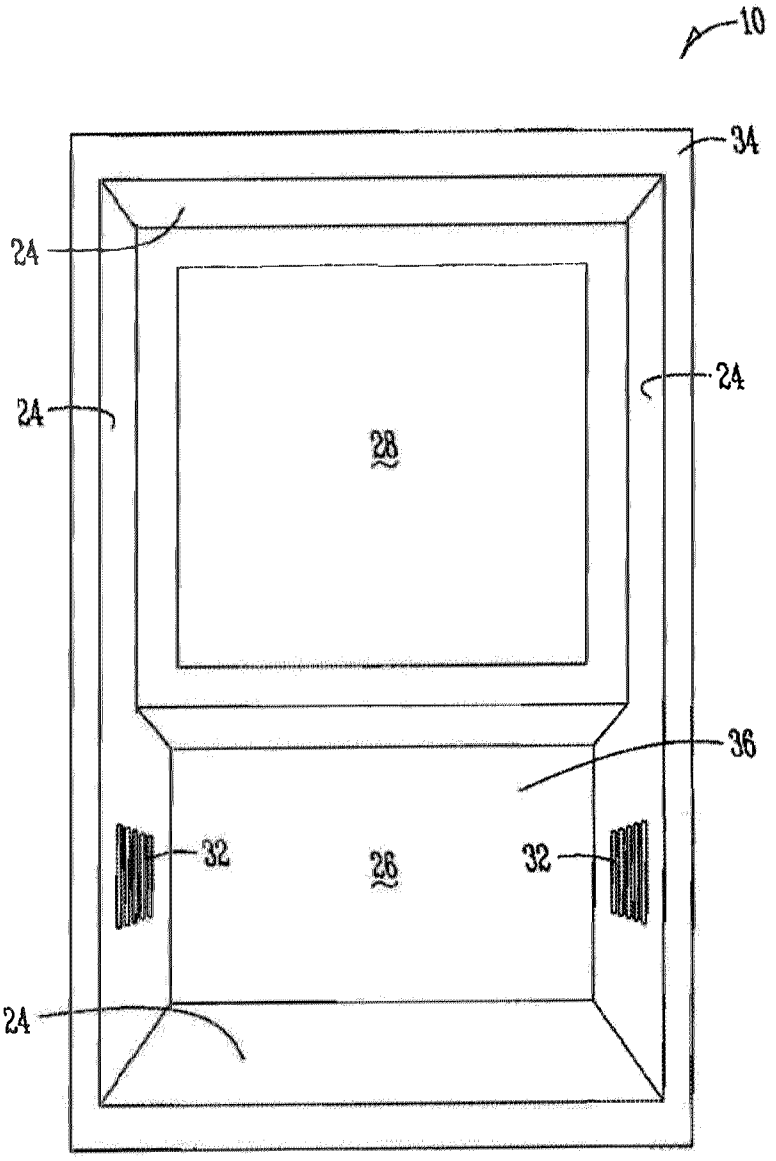


FIG. 3

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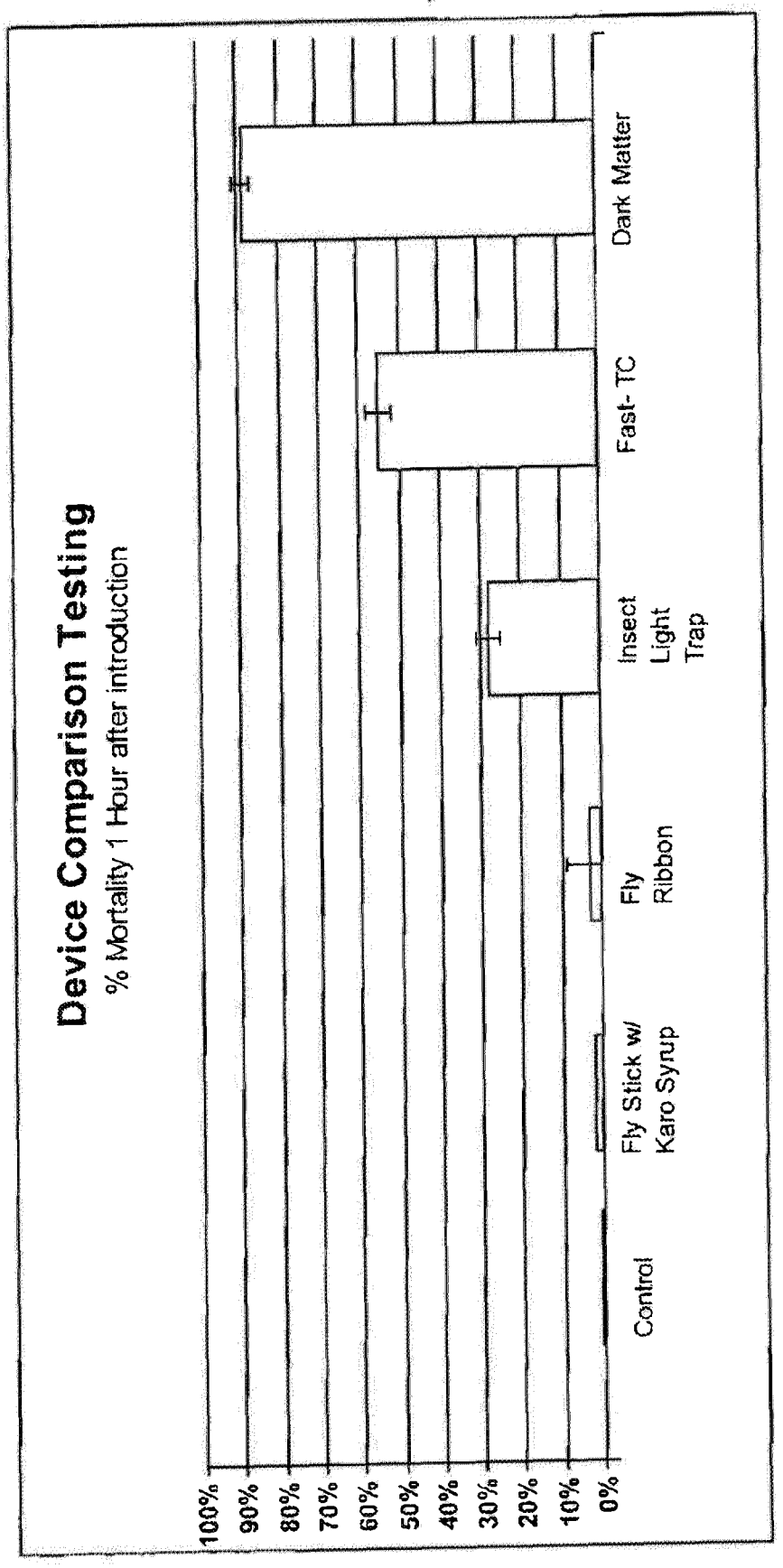

Device Comparison Testing
% Mortality 1 Hour after introduction
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Control
Fly Stick w/ Karo Syrup
Fly Ribbon
Insect Light Trap
Fast- TC
Dark Matter

FIG. 4

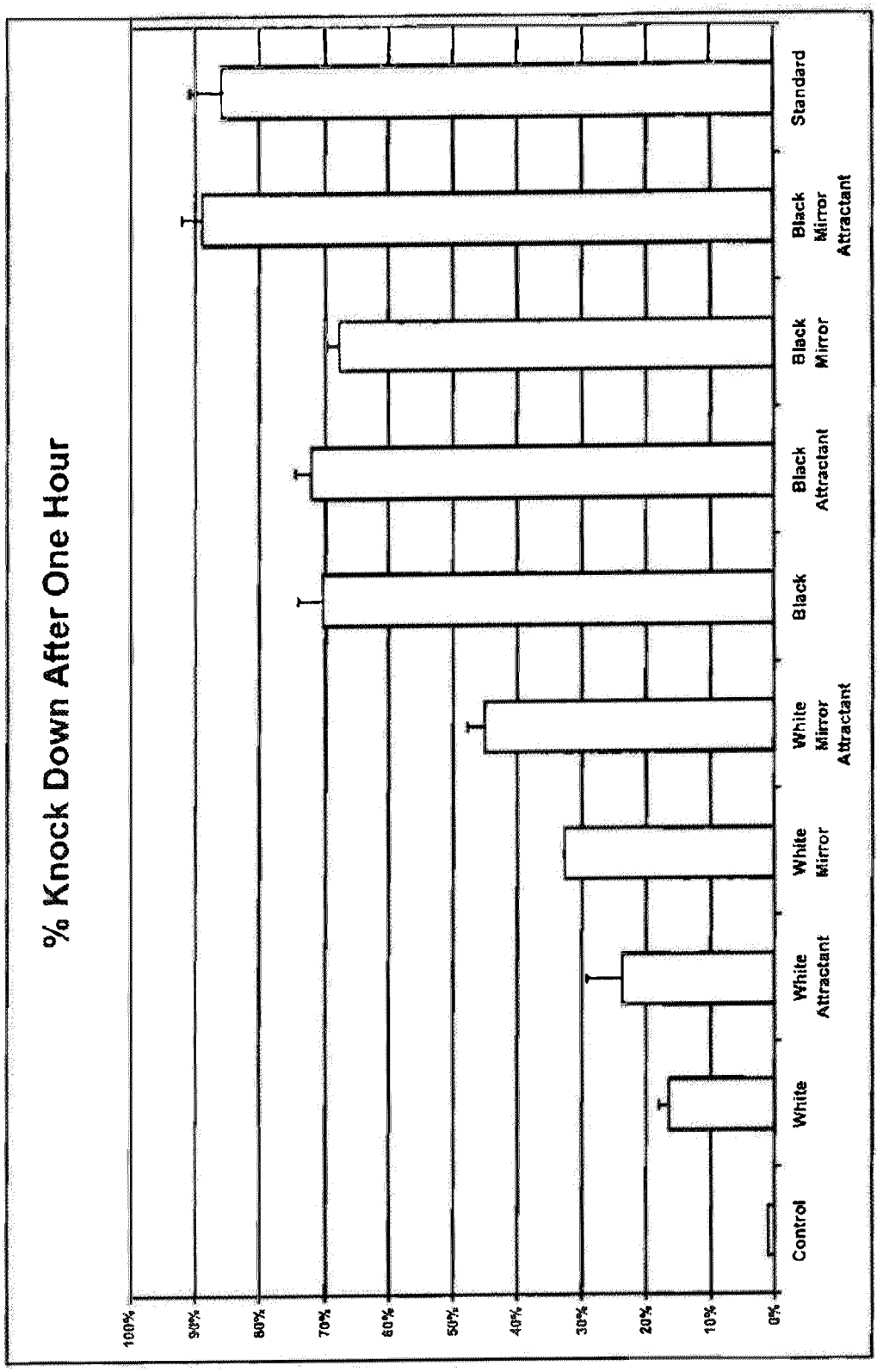

% Knock Down After One Hour
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Control
White
White Attractant
White Mirror
White Mirror Attractant
Black
Black Attractant
Black Mirror
Black Mirror Attractant
Standard

FIG. 5

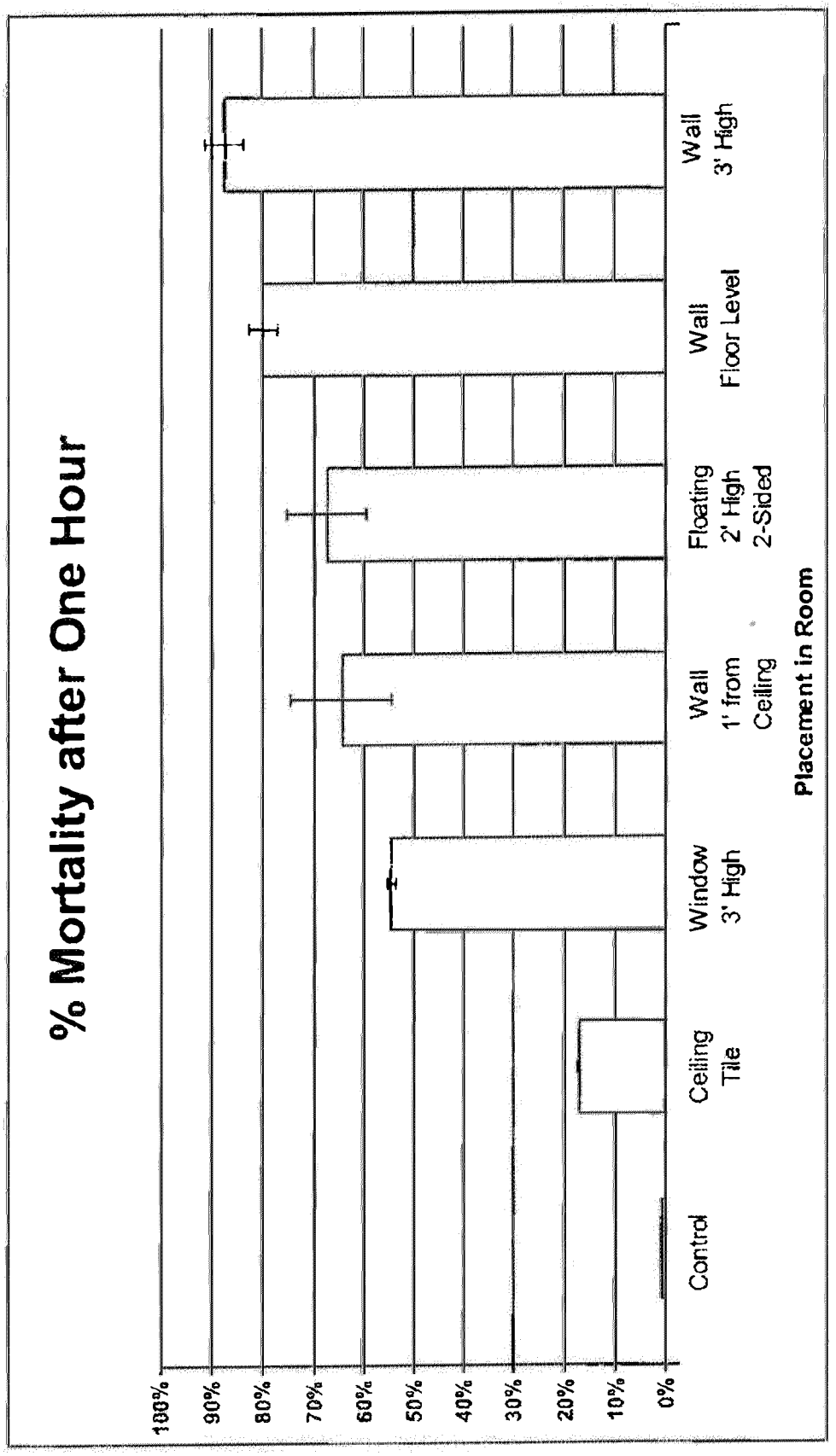

% Mortality after One Hour
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Control
Ceiling Tile
Window 3' High
Wall 1' from Ceiling
Floating 2' High 2-Sided
Wall Floor Level
Wall 3' High
Placement in Room

FIG. 6

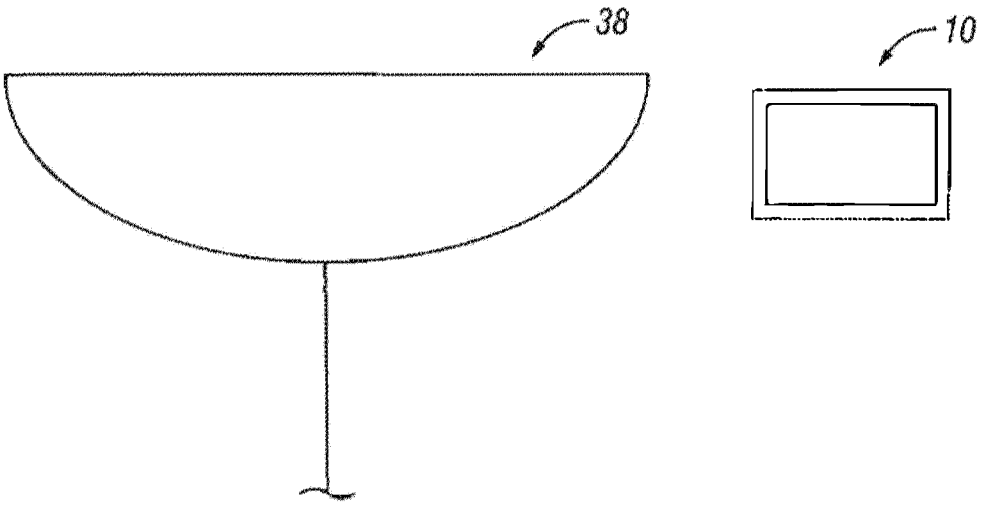


FIG. 7

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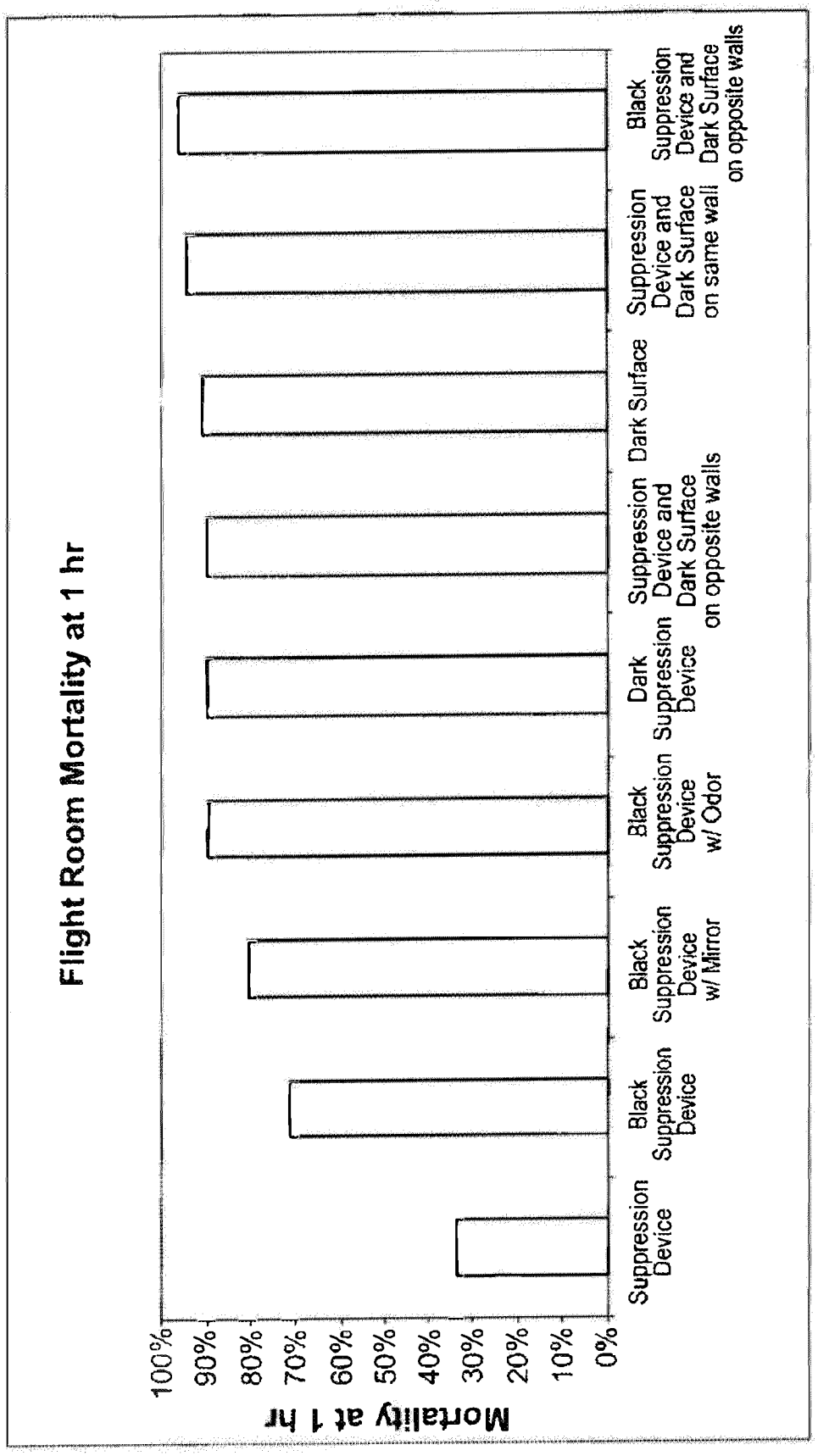

Flight Room Mortality at 1 hr
Mortality at 1 hr
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Suppression Device
Black Suppression Device
Black Suppression Device w/ Mirror
Black Suppression Device w/ Odor
Dark Suppression Device
Suppression Device and Dark Surface on opposite walls
Dark Surface
Suppression Device and Dark Surface on same wall
Black Suppression Device and Dark Surface on opposite walls

FIG. 8

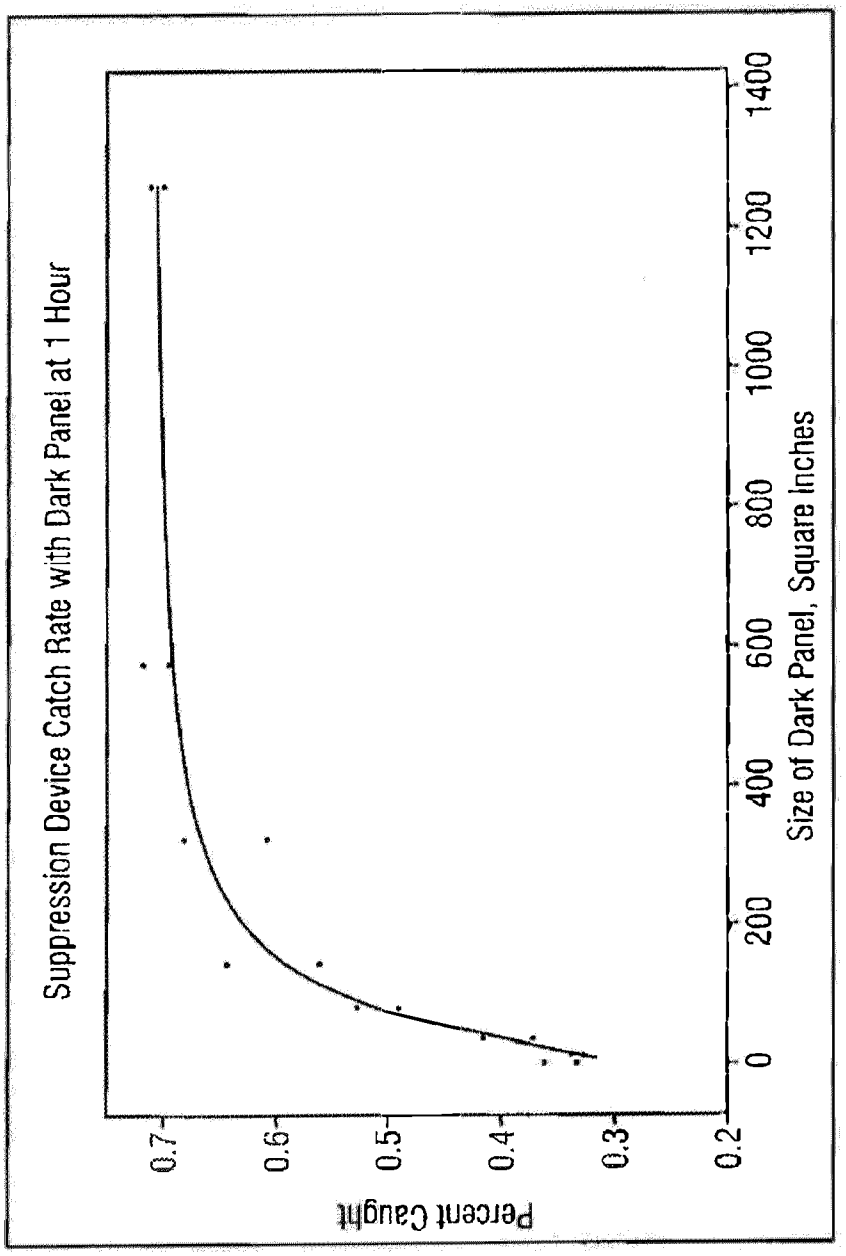

Suppression Device Catch Rate with Dark Panel at 1 Hour
Percent Caught
0.7
0.6
0.5
0.4
0.3
0.2
0
200
400
600
800
1000
1200
1400
Size of Dark Panel, Square Inches

FIG. 9

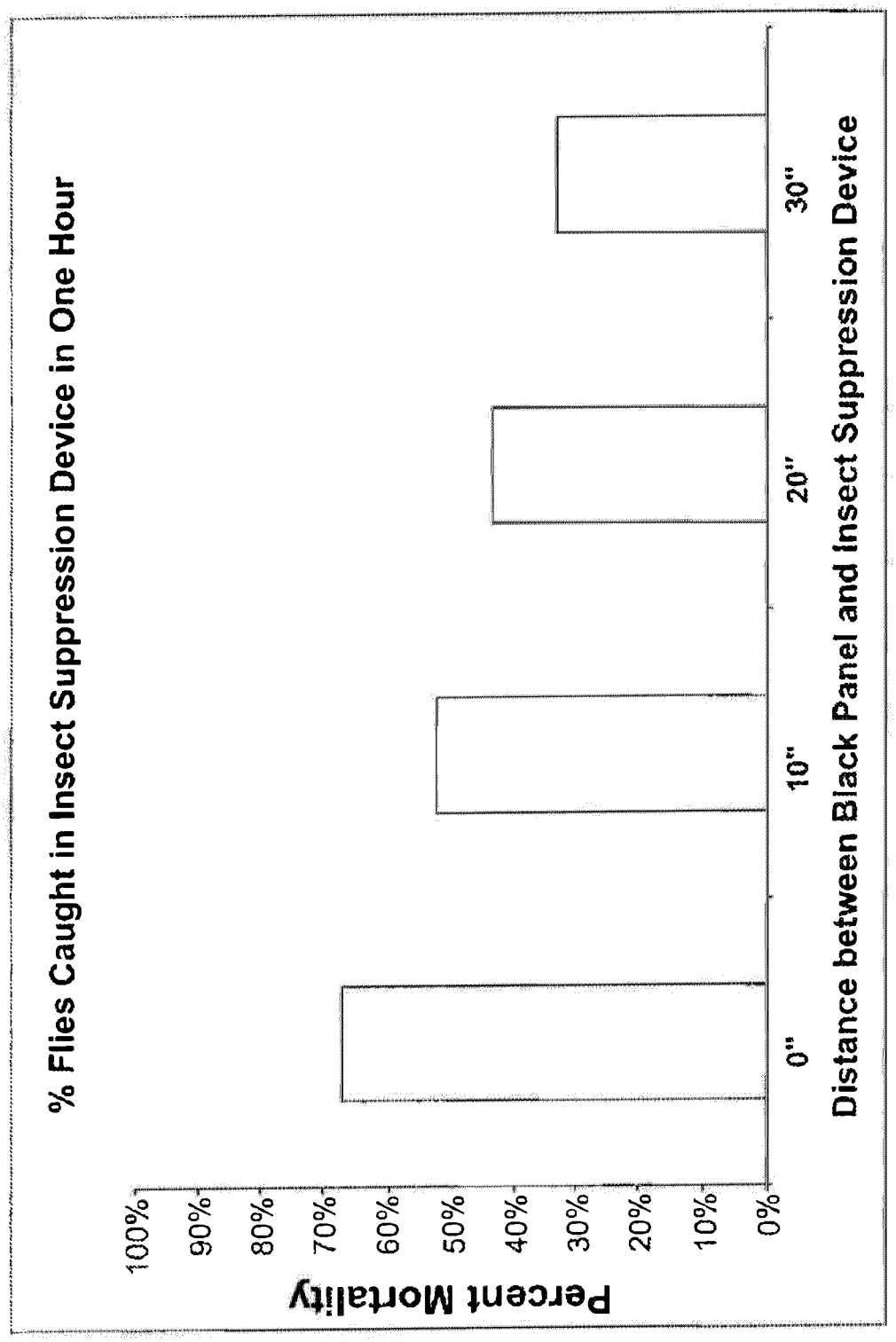


FIG. 10

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